REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated October 1, 2008. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

As outlined above, claims 1-4, 8-13, and 20-22 stand for consideration in this application, wherein claims 5-7 are being canceled without prejudice or disclaimer, while claims 1 and 8-10 are being amended. Claims 14-19 stand withdrawn from consideration in this application. In addition, new claims 20-22 are hereby submitted for consideration.

All amendments to the application are fully supported therein, including page 16, lines 22-25; page 23, lines 4-12; page 24, lines 18-23; page 25 and page 26, lines 1-9 of the specification. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Claim Objection

Claim 7 was objected to on the ground of informalities.

As mentioned above, claim 7 is being canceled, and thus this objection is moot. Accordingly, withdrawal of this objection is respectfully requested.

Prior Art Rejections

35 U.S.C. §102(b)/103(a) Rejections

Claims 1-13 were rejected under 35 U.S.C. §102(b) as being anticipated by, or in the alternative under 35 U.S.C. §103(a) as being allegedly unpatentable over Yoshida et al. (JP 07-085722). Please note that the firstly named inventor of JP 07-085722 is Yoshida, not Kitaura, and thus JP 07-085722 is referred to as "Yoshida" hereinafter.

As mentioned above, claims 5-7 are being cancelled. Applicants respectfully traverse the rejection of claims 1-4 and 8-13 for the reasons set forth below.

According to the M.P.E.P. §2131, a claim is anticipated under 35 U.S.C. §102 (a), (b), and (e) only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.

Claim 1

A semiconductive film as recited in claim 1 is formed from a resin composition comprising poly (ether ether ketone) (hereinafter PEEK) and conductive carbon black having a DBP oil absorption within a range of 30 to 700 ml/100 g in a proportion of 5 to 40 parts by weight per 100 parts by weight of the PEEK. The semiconductive film as recited in claim 1 exhibits not only small variation in volume resistivity but also little variation in thickness throughout the film while exhibiting markedly excellent folding endurance (flexing resistance). More specifically, the semiconductor film as recited in claim 1 has the following properties (a) to (c):

(a) the average value of its thickness is within a range of 30 to 250 μm, and the maximum value of the thickness is within a range of 1 to 1.2 times as much as the minimum value thereof,

(b) the average value of its volume resistivity is within a range of 1.0×10^2 to 1.0×10^{14} Ωcm, and the maximum value of the volume resistivity is within a range of 1 to 10 times as much as the minimum value thereof, and

(c) the number of reciprocating folds required up to cutting as determined by using a strip-like specimen have a width of 15 mm under conditions of a chuck bending angle of 135° right and left, a folding speed of 175 c/s and a load of 9.8 N per 100 μm of a thickness in accordance with "Testing Method for Folding Endurance by MIT Tester" as prescribed in JIS P 8115 is at least 10,000 times.

Applicants respectfully disagree with the Examiner's assertion that it would have been obvious to one having ordinary skill in the art to have maintained the most consistent thickness along the length of the film shown in Yoshida in order to minimize variations in the semiconductive properties of the belt.

To obtain the semiconductive film as recited in claim 1, a resin composition comprising PEEK and conductive carbon black is fed to an extruder and melt-extruded in the form of a film from a T-die or ring die, while controlling the temperature of the resin composition within a range of 350 to 410°C. Here, the T-die or ring die has the lip clearance controlled to at most 1.0 mm. The resultant film in the molten state is cooled and solidified by a cooling roll or cooling mandrel controlled to a temperature within a range of 60 to

120°C, and thus the semiconductive film as recited in claim 1 is obtained. (See page 12, line 1-10 of the specification.)

Tables 1-3 on pages 38-39 of the specification show the properties of Examples 1-4 and Comparative Examples 1-5 of a semiconductive film. The compositions and film-forming conditions of Examples 1-4 and Comparative Examples 1-5 are shown in Table 1. Generally, the cooling temperature of the cooling roll or cooling mandrel is set to 20°C when a PEEK film is formed. When pellets (resin composition) comprising PEEK and conductive carbon black are fed to an extruder and melt-extruded in the form of a film from a T-die and contacted with a cooling roll having the temperature set to 20°C, the resultant film exhibits extremely wide variation in thickness throughout the film. The maximum value of the thickness is 1.6 times as much as the minimum value thereof. (See Comparative Example 5 in Table 2.) Even when a film is formed by a ring die method, a tubular film exhibits wide variation in thickness throughout the film when the temperature of a cooling mandrel is set as low as 20°C. In other words, when a film is produced by melt-extruding a conductive resin composition comprising PEEK and conductive carbon black in the form of a film from a die, and then cooling the film at the temperature set as low as 20°C, a semiconductor film having little variation in thickness throughout the film cannot be obtained.

The semiconductive film of Comparative Example 5 exhibits extremely large variations in volume resistivity throughout the film. (See Comparative Example 5 in Table 2.) On the other hand, when the resin composition comprising PEEK and conductive carbon black is formed into a film and the cooling temperature of the film is controlled within a range of 60 to 120°C, the resultant semiconductive film exhibits extremely little variation in both thickness and volume resistivity throughout the film. (See Examples 1-4 in Table 2.)

When the lip clearance of a T-die or ring die is set to 1.5 mm, the resultant semiconductive film exhibits wide variations in both thickness and volume resistivity throughout the film and large anisotropy in tear strength. (See Comparative Example 2 in Table 2.) The semiconductive film of Comparative Example 2 exhibits great differences in the values of the tensile elongation at break in MD and TD, and anisotropy in tensile elongation at break is observed. (See Comparative Example 2 in Table 1.)

The semiconductive film of Examples 1-4 are obtained under the conditions that the lip clearance of the die is controlled to at most 1.0 mm, and the cooling temperature is controlled within a range of 60 to 120°C in forming a film from the resin composition comprising PEEK and conductive carbon black. It is apparent from Tables 1-3 that the

semiconductive films obtained under these conditions exhibit extremely little variation in both thickness and volume resistivity throughout the film. These semiconductive films are excellent in flexing resistance, modulus in tension, tensile elongation at break, and tear strength. Also, these semiconductive films are free of anisotropy in tensile elongation at break, and tear strength in both MD and TD.

On the other hand, a semiconductor film obtained under the condition that the lip clearance of the die is set to 1.5 mm, exhibits wide variation in thickness and volume resistivity throughout the film and large anisotropy (M/T = 0.57 < 2/3) in tear strength. (See Comparative Example 2.) Also, a semiconductive film obtained under the condition that the cooling temperature is set to 20°C exhibits wide variations in thickness and volume resistivity throughout the film. (See as shown in Comparative Example 5.)

In contrast, although Yoshida shows a resin composition having little variation in volume resistivity while having uniform semiconductivity throughout the film, the film shown in Yoshida will exhibit wide variations in thickness throughout the film for the reasons set forth below.

It is well-known to mix conductive carbon black into a thermoplastic resin in order to impart conductivity to the resin. Yoshida states that when a resin composition obtained by mixing carbon black into a thermoplastic resin is molded into a molded product, <u>the resultant molded product is unstable in conductivity and exhibits wide variation in conductivity, and thus it is extremely difficult to produce a molded product having stable performance</u>. (See paragraph [0002].) In Yoshida, to reduce the amount of variation in volume resistivity throughout the film, two kinds of carbon black, which are different in DBP oil absorption into a thermoplastic resin, are mixed. More specifically, carbon black A having a DBP oil absorption of 200 to 700 ml/100 g and carbon black B having a DBP oil absorption of 30 to 180 ml/100 g are used in combination. However, the PEEK film shown in Yoshida will exhibit wide variations in thickness throughout the film <u>because the cooling temperature is set to 20°C</u>.

Yoshida shows a film forming machine equipped with a spiral die having a diameter of 30 mm in Embodiment 2. A tubular molten resin passed through the spiral die was cooled through a cooling mandrel whose temperature was controlled by an internal cooling system. (See paragraph [0013].) The temperature of the cooling mandrel is controlled to 150°C ± 1°C. When the cooling temperature is set high in this manner where a PEEK composition is used, however, the resulting film will exhibit not only low tensile elongation at break but also

small reciprocating fold as shown by Comparative Example 4 in the present application. In addition, variation in volume resistivity throughout the resultant film will increase, as shown by Comparative Example 4 of the present application

Yoshida further shows in Embodiment 3 that two kinds of carbon black, which were different in DBP oil absorption, were mixed into PEEK to prepare pellets (resin composition) while the pellets were used to form a tubular film by the same film forming machine having the internal cooling system as that used in Example 2 . (See paragraph [0014].) The film is formed under conditions that the temperature of the spiral die is 385°C ± 1°C, and the cooling temperature in the cooling mandrel is 20°C ± 1°C. Variations in volume resistivity throughout the film are reduced within a range of 1 to 10 times because carbon black having a DBP oil absorption of 210 ml/100 g and carbon black having a DBP oil absorption of 126 ml/100 g are used in combination. However, since the temperature of the cooling mandrel is controlled to be as low as 20°C ± 1°C, it will be difficult to obtain a semiconductive tube having a uniform thickness throughout the film as shown by Comparative Example 5 of the present application.

Indeed, there is no need to use two kinds of carbon black, which are different in DBP oil absorption, in order to reduce variations in volume resistivity throughout the film. Comparing Examples 1-4 with Comparative Examples 2-3 shown in the present application, it is clear that a semiconductive film which has extremely little variation in volume resistivity and thickness throughout the film is obtained by using only one kind of conductive carbon black. In addition, the semiconductive film as recited in claim 1 is free of anisotropy in tensile strength and tensile elongation at break in addition to excellent various properties.

Furthermore, Yoshida does not show or suggest that the lip clearance is controlled to at most 1.0 mm when a semiconductive film is formed from the conductive resin composition comprising PEEK and conductive carbon black, and the cooling temperature such as the temperature of a cooling mandrel is controlled within a range of 60 to 120°C. Therefore, based on Yoshida's showing, it would not have been obvious that the semiconductive film has the properties as recited in claim 1.

In sum, the conditions for forming a film from the PEEK-containing resin composition disclosed in Yoshida are markedly different from the conditions adopted to form a semiconductive film as recited in claim 1, and a semiconductive film having a combination of the various properties recited in claim 1 cannot be obtained under the conditions shown in Yoshida.

Accordingly, the semiconductive film as recited in claim 1 is not anticipated by nor rendered obvious over Yoshida.

Claims 2-4, 8-13, 20-22

As to dependent claims 2-4, 8-13, and 20-22, the arguments set forth above with respect to independent claim 1 are equally applicable here. The corresponding base claim being allowable, claims 2-4, 8-13, and 20-22 must also be allowable.

Conclusion

In light of the above Amendments and Remarks, Applicants respectfully request early and favorable action with regard to the present application, and a Notice of Allowance for all pending claims is earnestly solicited.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and phone number indicated below.

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